

Cramer's Rule

A. Consider the simultaneous equations

$$2x + y = 11$$

$$5x + 2y = 27$$

(i) Solve these equations using matrix methods. Show all your steps clearly.

(ii) Calculate $\frac{\begin{vmatrix} 11 & 1 \\ 27 & 2 \end{vmatrix}}{\begin{vmatrix} 2 & 1 \\ 5 & 2 \end{vmatrix}}$

(iii) Calculate $\frac{\begin{vmatrix} 2 & 11 \\ 5 & 27 \end{vmatrix}}{\begin{vmatrix} 2 & 1 \\ 5 & 2 \end{vmatrix}}$

(iv) What do you notice about your answers to parts (i), (ii) and (iii)?

B. Consider the simultaneous equations

$$x - y = 13$$

$$7x + 3y = -1$$

(i) Solve these equations using matrix methods.

(ii) Calculate $\frac{\begin{vmatrix} 13 & -1 \\ -1 & 3 \end{vmatrix}}{\begin{vmatrix} 1 & -1 \\ 7 & 3 \end{vmatrix}}$

(iii) Calculate $\frac{\begin{vmatrix} 1 & 13 \\ 7 & -1 \end{vmatrix}}{\begin{vmatrix} 1 & -1 \\ 7 & 3 \end{vmatrix}}$

(iv) What do you notice about your answers to parts (i), (ii) and (iii)?

C. Using your answers to parts A and B, come up with two general answers to the equations:

$$ax + by = e$$

$$cx + dy = f$$